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Overview of numerical methods for solving optimal control problem in guidance algorithms

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Abstract

Numerical techniques for solving optimal control problems fall into two general classes: indirect methods and direct methods. In an indirect method, we rely on the Pontryagin's maximum principle and other necessary conditions to obtain a two-point boundary-value problem, which is then numerically solved for optimal trajectories. However, indirect methods are frequently subject to severe convergence problems. We examine the possibility of implementing these methods in guidance algorithms using a single processor. Calculations were performed in real time and conclusions are drawn about the robustness of these methods.

Keywords: Optimal control theory, two-point boundary value problem, shooting technique